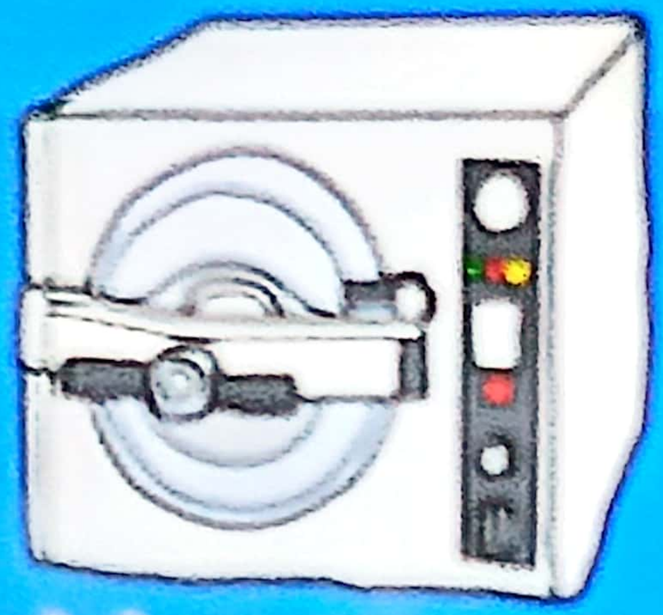
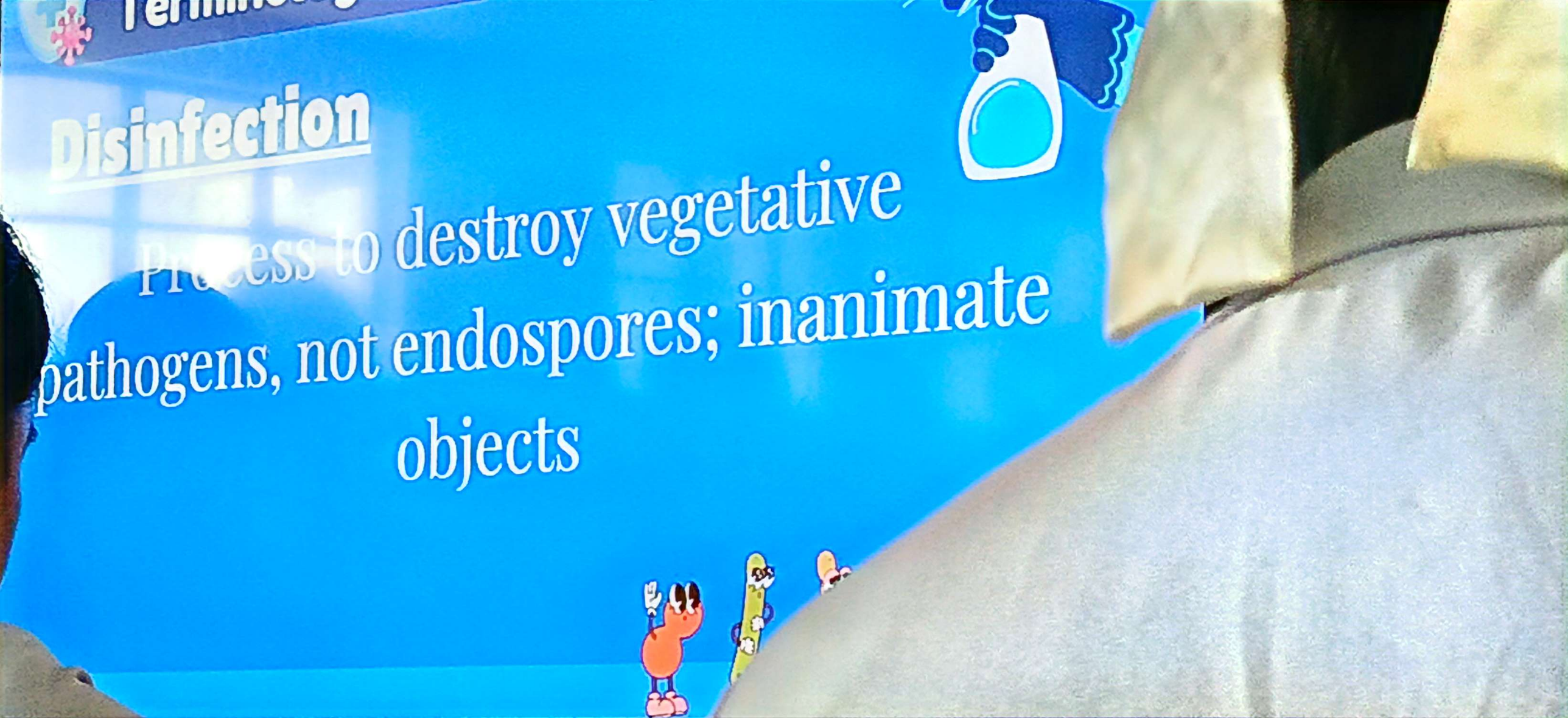
MICROBIAL CONTROL

Terminologies

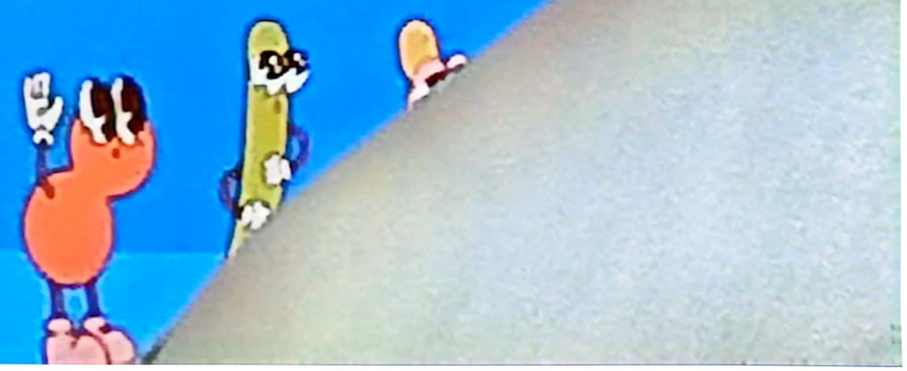


Process that destroys all viable microbes, including viruses and endospores; microbicidal


Disinfection
pathogens, not endospores; inanimate
objects

Disinfection

Unlike sterilization, disinfection does not guarantee that all pathogens are eliminated; indeed, disinfectants alone cannot inhibit endospores or some viruses.



Terminologies

Disinfectants

chemical agents applied to inanimate objects


Antisepsis
Disinfectants applied directly to
exposed body surfaces

Microbial Control

Microbial death - permanent loss of reproductive

Sterilization - process that destroys all viable microbes, including viruses, endospores & microbicidal

Terminologies

Antisepsis

Disinfectants applied directly to exposed body surfaces

Terminologies

Degerming

Degerming is the removal of microbes from a surface by scrubbing

REDUCES THE NUMBER OF MICROBES

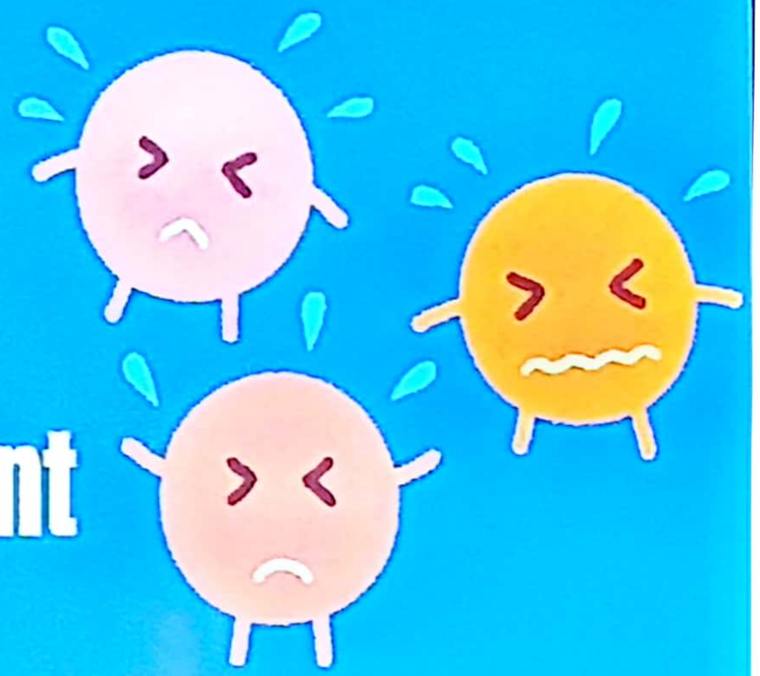
Terminologies

Sanitization

Sanitizing reduces the number of germs on objects and surfaces to levels considered safe.

Factors that Influence the Degree of Killing

- Types of Organisms
- Number of Organisms
- Concentration of Disinfecting Agent
- Presence of Organic Material
- Nature of surface to be disinfected



Factors that Influence the Degree of Killing

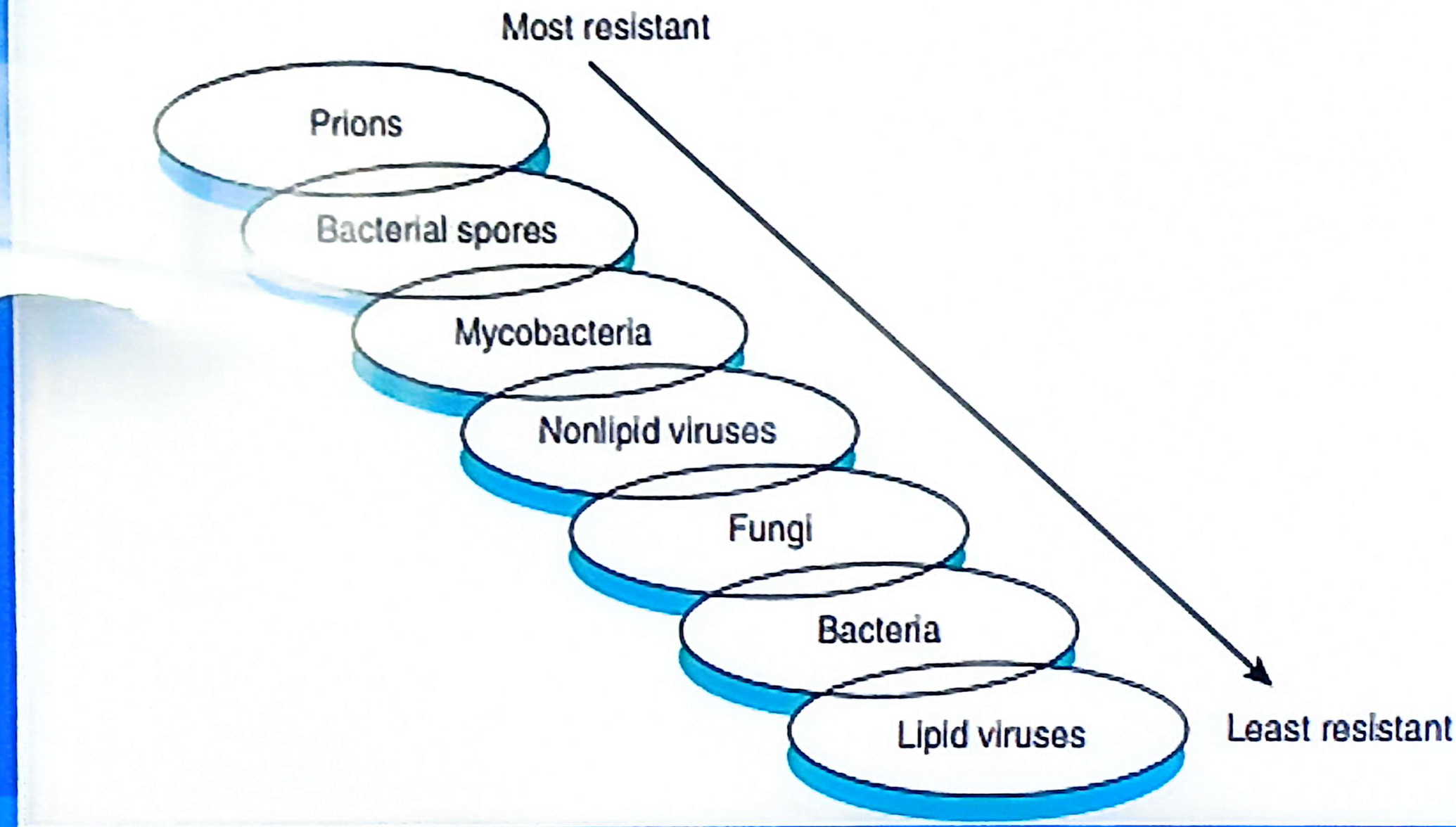
- Contact Time
- Temperature
- Biofilms

Factors that Influence the Degree of Killing

Types of Organisms

- Biochemical composition of Microorganisms
- Protective Mechanisms

Relative Resistance of Microbes

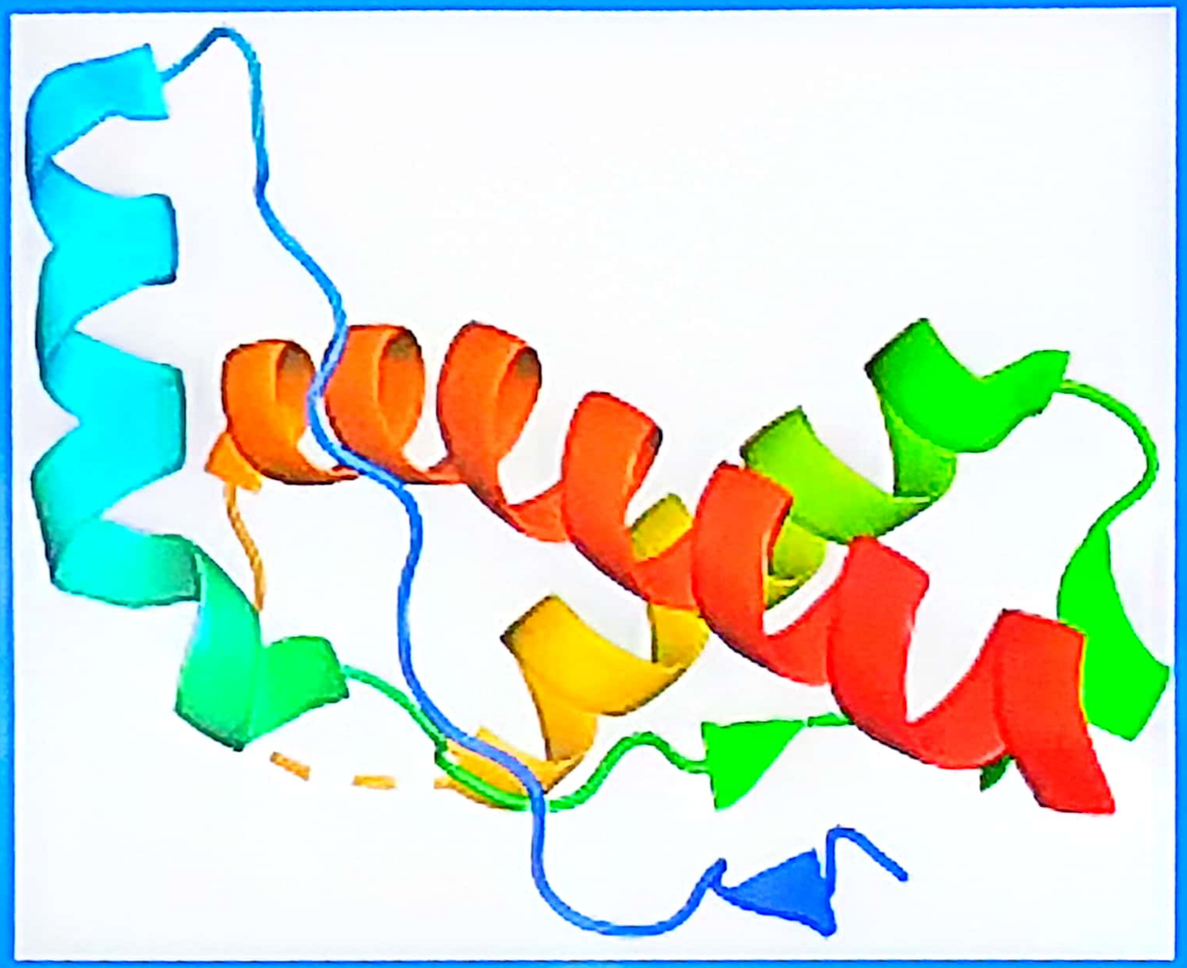


Factors that Influence the Degree of Killing

Types of Organisms

Prions

Naked pieces of protein



Factors that Influence the Degree of Killing

Types of Organisms

Prions

Cause a number of degenarative disease of the nervous system

Creutzfeldt-Jakob disease

Mad cow disease

Factors that Influence the Degree of Killing

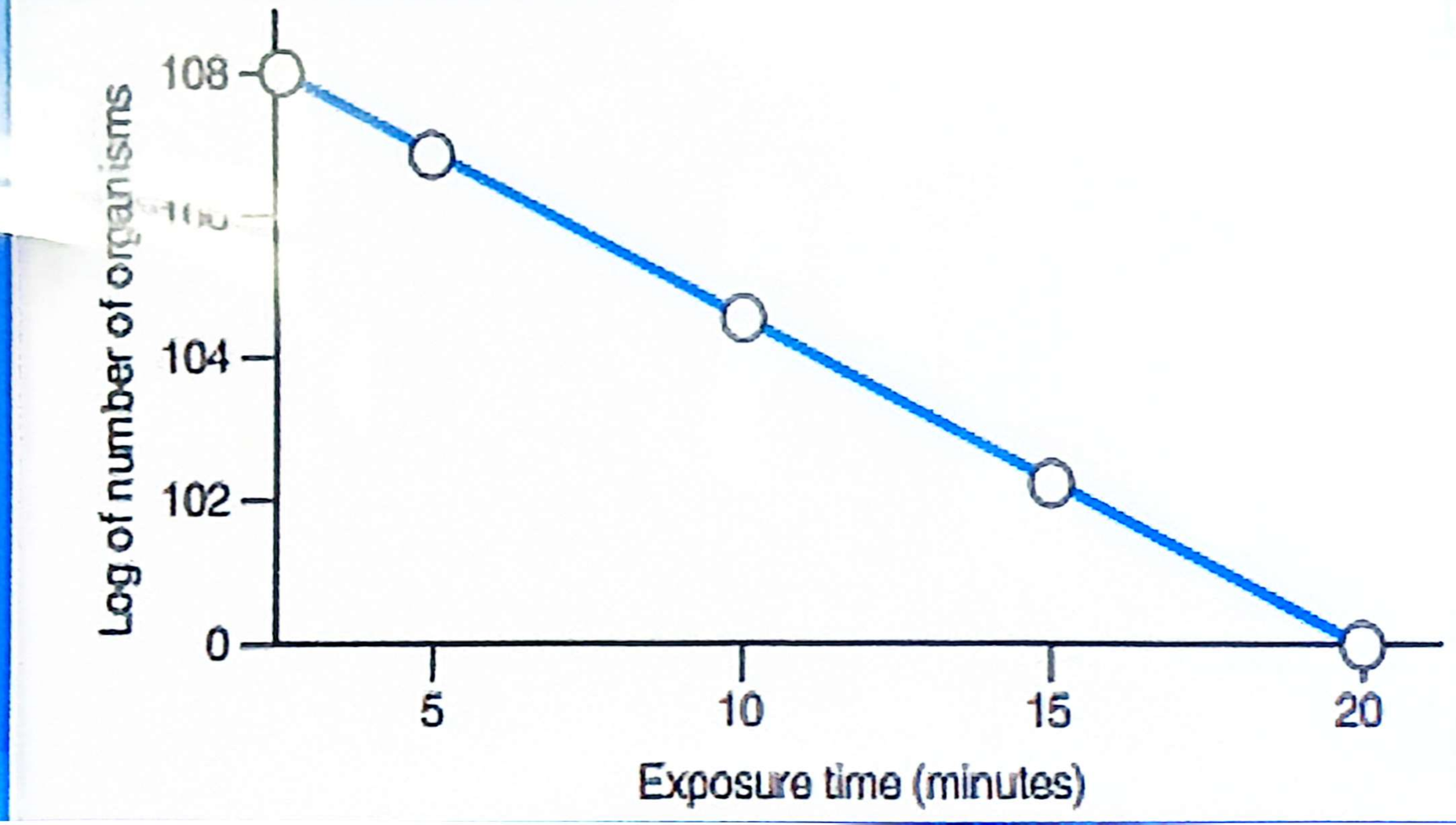
Number of Organisms

Microbial Load

- Total number of Organisms
- Bioburden

Factors that Influence the Degree of Killing

Number of Organisms



Factors that Influence the Degree of Killing

Number of Organisms

- Generally, the time necessary for killing microorganisms increases in direct proportion to the number of organisms (microbial load).

- Higher *numbers* of Organisms require longer exposure times

Factors that Influence the Degree of Killing

Presence of Organic Material

- It inactivates the disinfecting agent
- It prevents full contact between object and agent by coating the surface to be treated by coating the surface to be treated

Factors that Influence the Degree of Killing

Nature to Surface to be disinfected

Contact Time

The amount of time a disinfectant or sterilant is in contact with the object is critical

- Too little contact time does not allow the agent to work properly

Factors that Influence the Degree of Killing

Contact Time

- The amount of time that an agent is in contact with an object can also determine whether its is disinfecting or sterilizing the object

Factors that Influence the Degree of Killing

Biofilms

- Layers of Microorganisms that often have a protective material over them that shields them from outside environmental factors.

Factors that Influence the Degree of Killing

Biofilms

- In the presence of Biofilm, the concentration of disinfectant may need to be increased, the contact time may need to be increased, or both.

Factors that Influence the Degree of Killing

Compatibility of Disinfectants

Two is better than one may not be the case for disinfectants

Factors that Influence the Degree of Killing

Type of Water Available

- The type of water and its concentration in a solution are also important. Hard water may reduce the rate of killing of microorganisms.

Physical Methods of Sterilization

Moist Heat

Autoclave (Steam under Pressure)

- MOST EFFECTIVE METHOD OF STERILIZATION.
- KILLS ALL ORGANISMS INCLUDING VIRUSES AND SPORES.

Physical Methods of Sterilization

Moist Heat

Autoclave (Steam under Pressure)

- [x] LIQUID SOLUTIONS AND MEDICAL INSTRUMENTS :

121C AT 15 PSI FOR 15 MINUTES

Physical Methods of Sterilization

Moist Heat

Autoclave (Steam under Pressure)

- MEDICAL INFECTIOUS WASTES

132C FOR 30-60 MIN.

Physical Methods of Sterilization

Moist Heat

Autoclave (Steam under Pressure)

BIOLOGICAL INDICATOR:

Bacillus stearothermophilus

Physical Methods of Sterilization

Moist Heat

Fractional or Discontinuous Sterilization

- Tyndallization: flowing steam for 30 minutes of 3 successive days.

Physical Methods of Sterilization

Moist Heat

Fractional or Discontinuous Sterilization

- INSPISSATION: 75-80C FOR 2 HOURS ON 3 SUCCESSIVE DAYS

Physical Methods of Sterilization

Moist Heat

Fractional or Discontinuous Sterilization

- USED TO STERILIZE MEDIA CONTAINING MILK OR SERUM

Physical Methods of Sterilization

Moist Heat

Fractional or Discontinuous Sterilization

- ALTERNATE HEATING (KILLS VEGETATIVE CELLS)

Physical Methods of Sterilization

Moist Heat

Fractional or Discontinuous Sterilization

- ☑ INCUBATION- SPORES GERMINATE
- ☑ HEATING (KILLS REMAINING VEGETATIVE CELLS)

Physical Methods of Sterilization

Dry Heat

Hot air oven

ATTAINED AT 160C -180C

FOR 1 ½ TO 2 HOURS

Physical Methods of Sterilization

Dry Heat

Hot air oven

USEFUL IN THE STERILIZATION OF GLASS WARES

Physical Methods of Sterilization

Dry Heat

Hot air oven

CONTROL ORGANISM:

Bacillus subtilis var. niger

Physical Methods of Sterilization

Dry Heat

Incineration

For infectious wastes o Attained by burning the materials into ashes at 870C to 890C

Physical Methods of Sterilization

Dry Heat

Incinerator

Physical Methods of Sterilization

Filtration

It is accomplished through the use of thin membrane filters composed of plastic polymers or cellulose esters containing pores of a certain size

Physical Methods of Sterilization

Filtration

The liquid is pulled (vacuum) or pushed (pressure) through the filter matrix

Physical Methods of Sterilization

Filtration

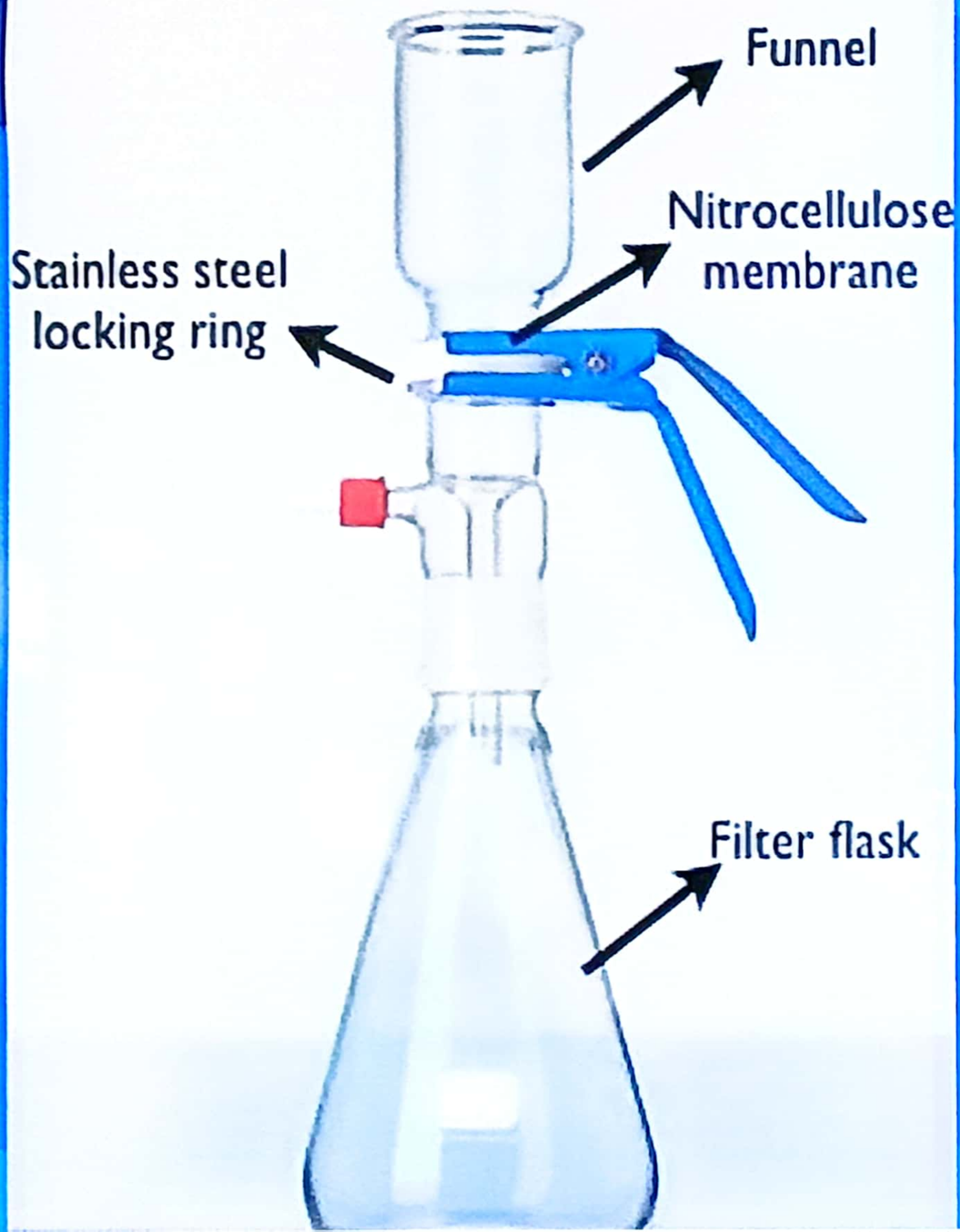
- For Carbohydrate solutions, antibiotics, vaccines, Radioisotopes
- For urea broth and sugar fermentation broth

Physical Methods of Sterilization

Filtration

- asbestos filter (Seitz - 98% effective)
- membrane filter [MILLIPORE] 0.22 $\frac{1}{2}$m = 100%bacterial sterility

Filtration


Funnel
Nitrocellulose membrane
Stainless steel locking ring
Filter flask

Physical Methods of Sterilization

Filtration

Hepa Filters (High-efficiency Particulate Air Filter)

= able to remove microorganisms larger han 0.3um and are used in laboratory hoods and in rooms of immunocompromised patients

Physical Methods of Sterilization

IONIZING RADIATION

In the form of gamma rays or electron beams

- Makes use of short wavelength and high energy

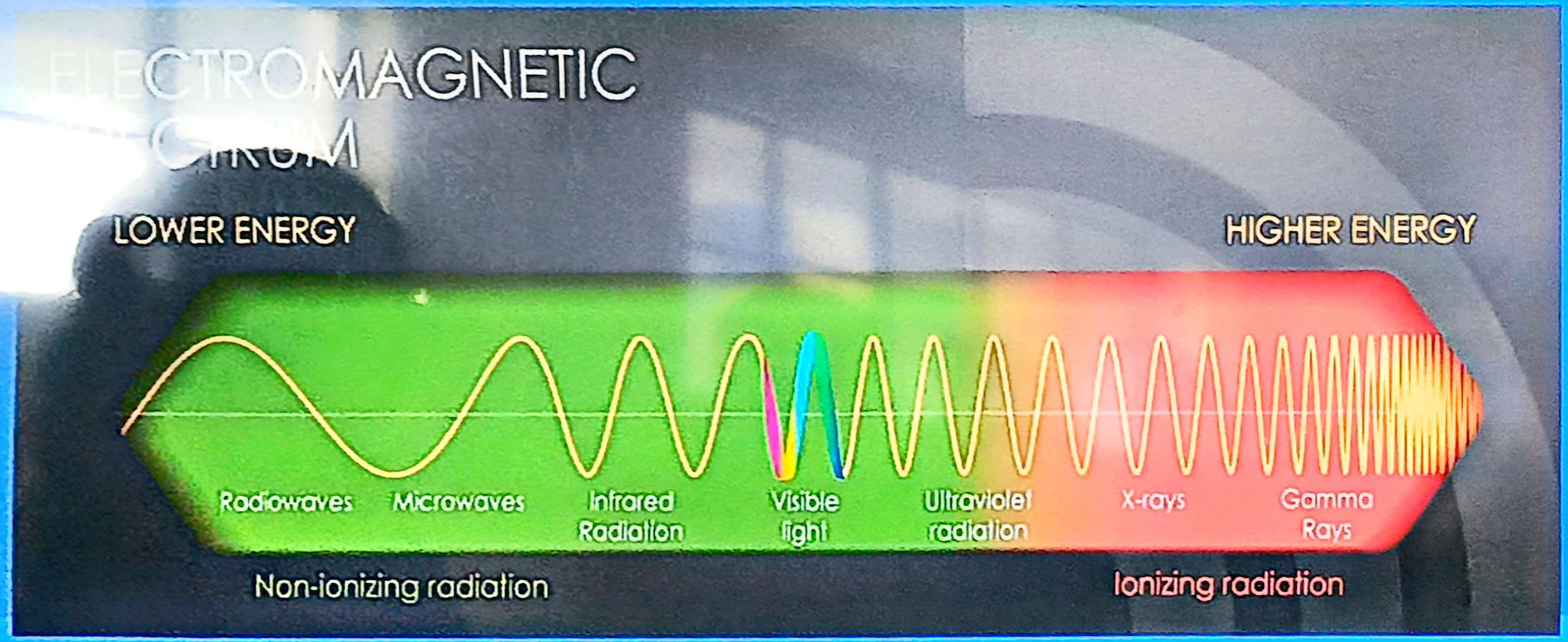
Physical Methods of Sterilization

IONIZING RADIATION

- Used to sterilize plastic syringes, gloves, catheters
- Control organism: ***Bacillus pumilis***

Physical Methods of Sterilization

IONIZING RADIATION



Physical Methods of Sterilization

NON IONIZING RADIATION

Makes use of long wavelength low energy UV rays

- It damages DNA by forming thymine and cytosine dimers

Physical Methods of Sterilization

NON IONIZING RADIATION

- Mercury lamps for rooms

Disinfection

Boiling

- ment: 100C for 15 mins.
- Result: Destroys vegetative cell but not the spores

Disinfection

Pasteurization

Destroys food pathogens for milk and dairy products wherein the total bacterial count is lowered by 95-99%

Disinfection

Pasteurization

- Methods:
  - Batch/Low Holding temperature: 30 min. at 62-63C
  - Flash/High Temperature short time: 15 sec at 72C.